EDITED BY WADE B. HOLLAND

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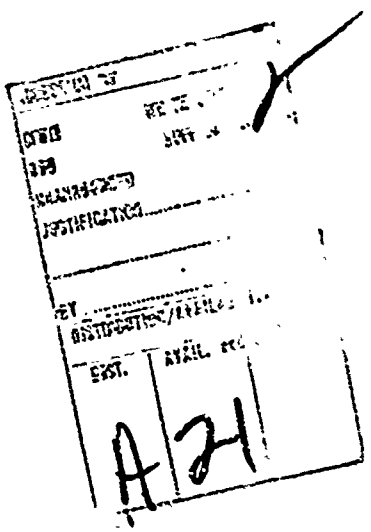

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10. ABSTRACT

A set of indexes to the 1971 issues of Soviet Cybernetics Review, and bibliography with abstracts of 19 other Rand publications in the field of Soviet cybernetics. There are detailed indexes by subjects, personalities (including authors, persons written about, and persons pictured), organizations, and hardware/software.

11. KEY WORDS

USSR--Cybernetics
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SOVIET CYBERNETICS REVIEW is published by The Rand Corporation as part of a program of research in the computer and system sciences. Its purpose is to disseminate to a wide range of specialists information about Soviet publications, activities, and new developments in computing technology, cybernetics, and scientific policy.

Issues prior to June 1969 were published under the name *Soviet Cybernetics: Recent News Items*. Text references to past issues are made in the form "*SCR*/69/6" (or "*SCRNI*/69/5"), where the first set of numerals refers to the year and the final set to the issue number.

Those who wish to receive *SCR* are invited to write Thomas M. Cockrell, 1700 Main Street, Santa Monica, California 90406.

1971 Index

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The Index to the 1971 issues of *SCR* is divided into four sections: Subjects, Personalities, Organizations, and Hardware/Software.

Index references are to the issue number and page number(s), separated by a slash (e.g., "6/37" refers to issue number 6, page 37). Explanation of additional reference notation is given on the first page of the section in which the notation is used.

An annotated bibliography of publications of The Rand Corporation on Soviet cybernetics and computer technology begins on page 37.

SUBJECT INDEX

PERSONALITY INDEX

Abbreviations used: *(au):* author of article on referenced page; *(biog.):* biographical information on the individual appears on referenced page; *(photo):* a picture of the indivjdual appears on referenced page.

ORGANIZATION INDEX

Organizational names may not appear in the referenced articles in exactly the same form as carried in the Index, a single standard form for each has been used in the index. In general, each organization is listed separately. Exceptions to this rule include entries for centers, sections, bureaus, laboratories, chairs, sectors, faculties, branches, and departments, which are listed under their respective organization. Entries for departments and branches of Academies of Sciences, however, are listed separately.

HARDWARE/SOFTWARE INDEX

Abbreviations used: *(h):* hardware item; *(s):* software item; *(photo):* picture of item appears on referenced page; *(spec):* technical specifications of item appear on referenced page. When applicable, all entries are transliterated from the Russian.

BIBLIOGRAPHY OF RAND PUBLICATIONS

Ware, W. H. (ed.), **Soviet Computer Technology—1959,** RM-2541, March 1, 1960. Reprinted in *IRE Transactions on Electronic Computers,* Vol. EC-9, No. 1, March 1960.

An account of a trip taken by two Rand computer specialists to the Soviet Union as part of an eight-man delegation representing the U.S. National Joint Computer Committee and its member societies. The genesis of the delegation and its itinerary in the Soviet Union are traced. The state of the art in Soviet computer technology as observed by the delegates is examined, showing the development, constructions, applications, routines, and components of the major Soviet computing machines. Impressions are included on Soviet education, the role of the Academy of Sciences, and Chinese developments in computer technology. Many photographs of Soviet machines, components, people, and places are included. First-hand information is also given on the BESM-1, BESM-2, Strela, Ural, and Kiev computers, plus several other machines. Machine specifications are presented in chart form, facilitating comparisons; op codes are given for the Ural-1 and Ural-2. 205 pp. Illus.

Feigenbaum, E. A., **Soviet Cybernetics and Computer Sciences, 1960,** RM-2799-PR, October 1961. Reprinted in *IRE Transactions of Electronic Computers,* Vol. EC-10, No. 4, December 1961.

A description of the author's experiences as a delegate to the International Congress on Automatic Control, held in Moscow, June 27-July 7, 1960. The Memorandum discusses: (1) certain aspects of the conference; (2) some Soviet research projects in artificial intelligence and biocybernetics; and (3) general Soviet attitudes, techniques, and directions in the cybernetic and computer-related sciences. It is concluded that Soviet research in the computer sciences lags behind Western developments, but that the gap is neither large nor based on a lack of understanding of fundamental principles. The Soviets will progress rapidly if and when priority, in terms of accessibility to computing machines, is given to their research. 77 pp. Illus.

Krieger, F. J., **Soviet Philosophy, Science, and Cybernetics,** RM-3619-PR, April 1963.

A discussion of how all aspects of science—i.e., knowledge—are made to conform to the ideological mold of Marxism-Leninism in the Soviet Union. The larger part of the Memorandum consists of a thematic plan from the Soviet journal *Questions of Philosophy (Voprosy filosofii),* which lists over 300 topics suggested for discussion and study in the Soviet-planned society. 27 pp.

Ware, Willis H., and Wade B. Holland (eds.), **Soviet Cybernetics Technology: I. Soviet Cybernetics, 1959-1962,** RM-3675-PR, June 1963.

Seven sets of translations in the area of Soviet cybernetics, together with commentary and analyses on the status of cybernetics in the Soviet Union and the direction of Soviet cybernetics research. This volume is concerned with general computer technology and cybernetics applications, rather than with specific machines. Particular emphasis was placed on selecting items for translation that survey the activities of organizations and conferences, and the current literature. 104 pp. Illus.

Ware, Willis H., and Wade B. Holland (eds.), **Soviet Cybernetics Technology: II. General Characteristics of Several Soviet Computers,** RM-3797-PR, August 1963.

Several sets of translations detailing specifications for the Ural-2, Ural-4, BESM-2, Razdan-2, MN-10 and MN-14, Luch, and EPOS computers. The level of detail varies widely among the several articles, which were taken from such diverse sources as specification brochures, items in the popular press, technical journals, etc. Included is a set of instructions for the BESM-2 which is quite dissimilar to that presented in Elements of Programming (see Vol. III in this series). 67 pp. Illus.

Ware, Willis H., and Wade B. Holland (eds.), **Soviet Cybernetics Technology: III. Programming Elements of the BESM, Strela, Ural, M-3, and Kiev Computers,** Translated by A. S. Kozak, RM-3804-PR, September 1963.

A translation from the Russian book *Elements of Programming,* detailing the instruction formats for five of the better known Soviet digital computers. Some notes are included to help place the machines in perspective. Specially-prepared charts give the operation codes for the five machines, along with the original Russian terminology and its English translation. 91 pp. Illus.

Levien, Roger, and M. E. Maron, **Cybernetics and Its Development in the Soviet Union,** RM-4156-PR, July 1964.

An introduction to the subject of cybernetics with special reference to its origins and ramifications in the United States and its subsequent development in the Soviet Union. Intended for nonexperts in the field, it attempts to provide a sufficient nontechnical background to facilitate appreciation of the potential impact of cybernetics on science and society. The survey of Soviet cybernetics reveals the intense interest and activity in the Soviet Union, pointing out how scientific research, military applications, economic planning, education, industry, etc., are affected by developments in cybernetics. 35 pp.

Holland, Wade B., (ed. and trans.), **Soviet Cybernetics Technology: IV. Descriptions of the MN-11, MN-M and MN-7 Analog Computers and of Three Miscellaneous Electronic Devices,** RM-4461-PR, February 1965.

A collection of translations detailing technical specifications of the three indicated Soviet analog computers, and of the BPZ-1 fixed-delay unit, the I-5 CRT indicator, and the VPRR-2 electronic device for controlling tooling modes. The translations have been made from equipment specification brochures prepared for use by the Soviet technical and scientific community and for use at exhibits and trade fairs. 22 pp. Illus.

Ware, Willis H., and Wade B. Holland (eds.), **Soviet Cybernetics Technology: V. Soviet Process Control Computers,** RM-4810-PR, November 1965. Reprinted as "008 Russian Control Computers," in *Control Engineering*, Vol. 13, No. 5, May 1966, pp. 119-125.

Details of eight recently developed Soviet process control computers, based mainly on translations from Soviet source material. The translations are heavily annotated and all pictures and diagrams from the original source items, as well as several photographs from other sources, are included. The editors have appended many explanatory notes and comments, and have carefully checked each machine description from a technological standpoint. An appendix contains an alphabetical listing of all abbreviations used in the original Russian texts. 92 pp. Illus.

Shiller, F. F., "An Algorithmic Language for Describing Economic Mathematical Problems (ALGEM)," **Digital Computer Engineering and Programming** *(Tsifrovaia Vychislitel'naia Tekhnika i Programmirovanie)*, No. 1, A. I. Kitov, Editor, Moscow, 1966; translated by Patricia L. Stephan, LT-66-44, September 1, 1966.

An unannotated translation of Shiller's description of ALGEM, a language derived from ALGOL 60 for describing economic mathematical problems. ALGOL 60 is supplemented by the introduction of *string* type quantities, string expressions and functions, and compound variables and functions.

Holland, Wade B., and Joy B. Gazley (trans.), **Soviet Cybernetics Technology: VII. ALGEC—Report on an Algorithmic Language for Economics Calculations (Preliminary Version),** RM-5135-PR, September 1966.

A working version of an expansion of the international high-level computer language ALGOL 60 to meet Soviet economic planning needs. A committee headed by M. A. Korolev was directed by the Soviet government to create such a language. ALGEC converts ALGOL 60 for use with the Cyrillic alphabet, provides for handling text, editing, list processing, and for access to individual items on lists and arrays. The Rand translators of the Russian draft show all changes from the original ALGOL 60. ALGOL conventions ignored by the author have been restored, and ambiguities clarified. Definitions of terms and syntactic units have been indexed. Russian-English and English-Russian glossaries of all ALGOL and ALGEC terms are appended. (The version of ALGEC translated in this Memorandum is superseded by that contained in Part VIII, RM-5136-PR.) 158 pp.

Holland, Wade B. (trans.), **Soviet Cybernetics Technology: VIII. Report on the Algorithmic Language ALGEC (Final Version),** RM-5136-PR, December 1966. Reprinted in *Cybernetics*, Vol. 2, No. 2, March-April 1966 (a translation issued by The Faraday Press, Inc., of the Russian-language journal *Kibernetika).*

A translation of the final version of the new Soviet Algorithmic Language for Economics Problems (ALGEC), a general-purpose computer programming language that can use both Latin and Cyrillic alphabets and either Russian or English reserved words. Based on ALGOL 60 and SUBSET ALGOL 60, ALGEC has been modified to permit the handling of tables, records, indexes, etc., and documents of complex format and variable length; it also provides a means of selecting and processing individual items from such documents and from nonnumerical textual matter. Ideas and input-output procedures were taken from COBOL-61. The Memorandum includes a translation of M. Korolev's article on the development of ALGEC, a brief biographical note on the Russian authors and editor, a Russian-English glossary of

ALGEC terminology, and an English-Russian glossary included in an index to definitions of terms and syntactic units. 152 pp.

Wirth, Niklaus, **Soviet Cybernetics Technology: IX. ALGEC—Summary and Critique**, RM-5157-PR, February 1967.

A summary and evaluation of the preliminary and final versions of ALGEC, the Soviets' Algorithmic Language for Economics Problems. The ALGEC computer programming language for economics data processing is an almost pure extension of ALGOL 60. The deletions are in conformity with the IFIP-approved SUBSET ALGOL. The extensions add features obviously needed to handle nonnumeric data. While not a complete list-processing language, ALGEC appears to be adequate for business data processing, with the possible exception of decimal arithmetic. Also, input-output transfers cannot be identified by source. The retention of nested strings from ALGOL is an unnecessary complication, and the use of COBOL-style data structures (lists) precludes the handling of data with complex and dynamically varying relationships. Definitions lack precision, and the semantic and syntactic rules are unrealistic, 51 pp.

Holland, Wade B., **Russian-English Dictionary of Cybernetics and Computer Technology**, 2nd ed., RM-5108-1-PR, February 1969.

This dictionary contains approximately 5350 entries, covering many aspects of the broad field of cybernetics. Emphasis is on the subentries that augment the 2050 major entries, and which define the key terms as used in phrases, expressions, and special constructions. The dictionary was assembled in working with Russian technical literature during the course of Rand research in computer technology and Soviet cybernetics. There has been no effort to produce a definitive glossary of the Russian terminology. The entire dictionary is stored on magnetic tape and is machine processed for output, facilitating corrections and additions. 244 pp.

Computers and Thought, Edited by E. A. Feigenbaum and J. Feldman, New York, McGraw-Hill, 1963, 535 pp., $7.95, Reviewed by A. V. Napalkov, Candidate of Technical Sciences, and Iu. V. Orfeev, Engineer, in *New Books from Abroad (Novye knigi za rubezhom)*, Series B, Technology, No. 1, 1965, pp 90-98; translated by Patricia J. Stephan and Wade B. Holland, LT-66-68, February 1, 1967.

An unannotated translation of a Soviet review of the collection of articles, *Computers and Thought*, edited by E. A. Feigenbaum and J. Feldman. The review was published in a Soviet journal that specializes in reviewing books published in the West. The reviewers briefly cover each section of the collection, paying special attention to many of the individual articles. Some clues to Soviet attitudes can be obtained from the reviewers' comments. The treatment is quite favorable, and the review closes with a recommendation that the entire collection be translated into Russian. **A Russian edition was published in 1967,** *Vychislitel'nye mashiny i myshlenie*, Izdatel'stvo "Mir," Moscow.

Di Paola, R. A., **A Survey of Soviet Work in the Theory of Computer Programming**, RM-5424-PR, October 1967.

A critical survey of Soviet efforts to develop a mathematical theory of computer programming and automatic programming methods. The study traces the development of the 'operator' theory of A. A. Lyapunov and his associates from its starting point in program schemes designed to represent specific problem-solving algorithms to its algebraic formulation in terms of the theory of categories. Other authors have attempted to adapt graph theory and the theory of algorithms to the construction of better programming languages. In contrast to FORTRAN, the practical result of programming programs has been to raise, rather than lower, the level of technical knowledge required for programming. Current Soviet research is directed toward adaptation and extension of ALGOL-60 rather than further theoretical work. Some of the Soviet work, however, may be of practical relevance, particularly Glebov's synthesis of operators from measurably simpler ones. 144 p. Refs.

Holland, Wade B. (ed.), **Soviet Cybernetics Technology: X. Bibliography of Literature Cited in 1964 Issues of the "Journal of Abstracts—Cybernetics,"** RM-5587-PR, February 1968.

A listing, by author, of all the publications of Soviet origin, or published in the Soviet Union, that were abstracted in the 1964 issues of the *Referativnyj zhurnal—Kibernetika*, a monthly publication of the All-Union Institute of Scientific and Technical Information under the USSR Academy of Sciences. The listing contains the bibliographic data only, not the abstracts. The coverage reflects the extremely broad meaning of "cybernetics" in the Soviet Union: it is applied to mathematical and computational techniques and to all forms of information, communication, and control, including, for example, such areas as programmed instruction and neurophysiology.

Works in seven Soviet languages are included. All entries have been translated into English. A complete citation is given under each author of a joint work. A list of 55 Soviet publishing houses and 185 titles of journals and irregular serial publications, as extracted from the citations, is included. 303 pp.

Barsamian, Harut, **Soviet Cybernetics Technology: XI. Homogeneous, General-Purpose, High-Productivity Computer Systems—A Review**, RM-5551-PR, April 1968.

A review and evaluation of the first Soviet book entirely devoted to problems of high-productivity computing systems. Published in late 1966, the book reports on studies conducted at the Institute of Mathematics in Novosibirsk. Since the Soviet system of national economic planning requires a large volume of coordinated, relatively simple calculations, and Soviet computer technology does not equal that of the West, the authors, E. V. Evreinov and Yu. G. Kosarev, have sought a way to increase computer productivity without greatly increasing technological demands. Their solution is parallelism: the coupling of up to 1000 computers, each capable of a million operations per second, so that all work together on the same program at the same time. However, the authors have not succeeded in establishing a new approach based on parallelism that will solve the problems of increased productivity, nor have they made a convincing case for their basic assumptions. The proposed linking of 1000 branch computers to achieve the desired throughput is not feasible, nor is the use of homogeneous computing media to develop the microstructure of the system. Methods of controlling and monitoring parallel algorithms are not considered. Although all theoretical conclusions were supposedly verified on the experimental Minsk-222 system (consisting of Minsk-2 and Minsk-22 computers), the actual results are not documented and there is no clear description of the operations performed. 33 pp.

Doncov, Boris, **Soviet Cybernetics Technology: XII. Time-Sharing in the Soviet Union**, R-522-PR, October 1971.

A study of the current state of Soviet computer technology, the major computers suitable for timesharing, and timesharing applications and research. Timesharing is still underdeveloped in the USSR. The only operational Soviet timesharing systems are incorporated in special-purpose, fixed-application installations; most are used for industrial process control or management information. All timesharing projects to date have been implemented on inadequate existing computers, such as Minsk-22, M-220, and BESM-6, that can support only rudimentary timesharing systems. However, this situation may soon change. The Directives of the 24th Congress of the Communist Party and the statement of goals for the 1971-75 Five-Year Plan indicate that computer development and computational techniques will receive greater emphasis. Moreover, the forthcoming Ryad series of third-generation computers, patterned after the IBM 360, will be able to support extensive timesharing applications. Large modular systems, like the Ural and M series, are also suitable for timesharing. 75 pp.